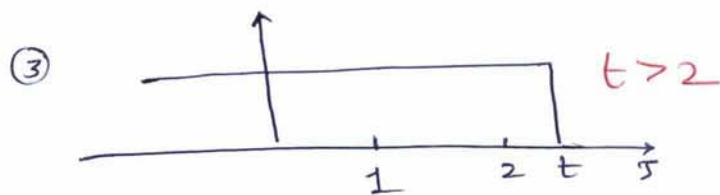
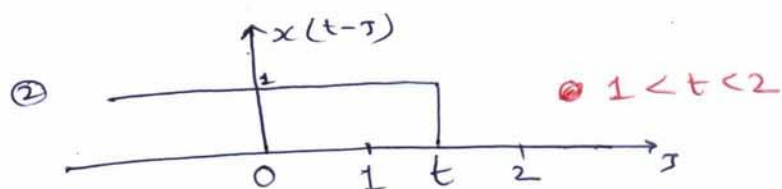
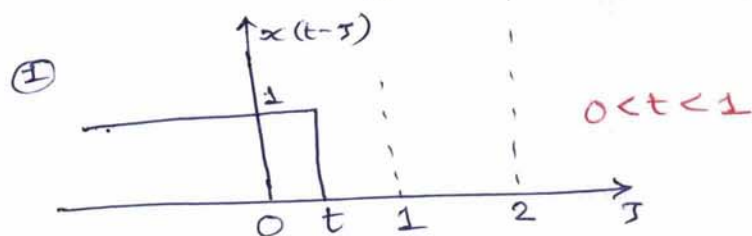
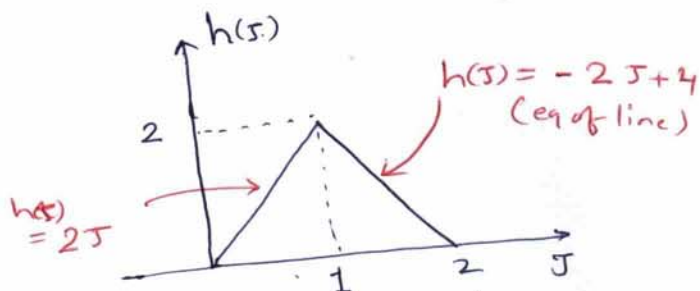
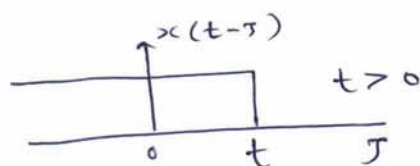
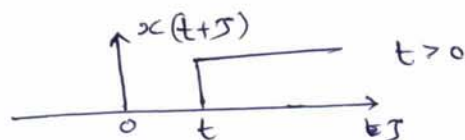
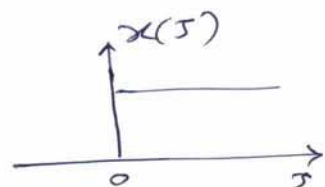


1. $y(t) = x(t) * h(t)$

$$y(t) = \int_{-\infty}^{\infty} x(\tau) \cdot h(t-\tau) d\tau$$

using commutative property

$$y(t) = \int_{-\infty}^{\infty} h(\tau) \cdot x(t-\tau) d\tau$$



① $0 < t < 1$

$$\therefore y(t) = \int_0^t (2\tau) d\tau$$

$$= \tau^2 \Big|_0^t = t^2$$

② $1 < t < 2$

$$y(t) = \int_0^1 h(\tau) d\tau + \int_1^t h(\tau) d\tau$$

$$= \int_0^1 2\tau d\tau + \int_1^t (-2\tau + 4) d\tau$$

$$= -\tau^2 + 4\tau - 2 \Big|_1^t = -t^2 + 4t - 2$$

③ $t > 2$

$$y(t) = \int_0^1 h(\tau) d\tau + \int_1^2 h(\tau) d\tau$$

$$= \int_0^1 2\tau d\tau + \int_1^2 (-2\tau + 4) d\tau = 2$$

ANSWER

$$y(t) = \begin{cases} 0 & t < 0 \\ t^2 & 0 \leq t < 1 \\ -t^2 + 4t - 2 & 1 \leq t < 2 \\ 2 & 2 \leq t \end{cases}$$